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Attorney Docket: 225/48700 8-31-02
PATENT #119

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

1 of 3

Applicant:	CHRISTOPH ESPEY		
Serial No.:	09/529,365	Group Art Unit:	3753
Filed:	JUNE 13, 2000	Examiner:	JOHN FOX
Title:	ELECTRICALLY CONTROLLED VALVE		

APPEAL BRIEF

Commissioner for Patents
Washington, D.C. 20231

Sir:

Appellants hereby appeal from the final rejection of January 24, 2002 in which claims 8-9, 15-16 and 22 have been finally rejected

I. REAL PARTY IN INTEREST

The real party in interest is **DaimlerChrysler AG**, Epplestrasse 225, D-70567 Stuttgart, Federal Republic of Germany.

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Appellant, Appellants' legal representatives or Assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

III. STATUS OF CLAIMS

This application contains Claims 8-22 with Claims 10-14 and 17-21 being withdrawn from consideration based on a provisional election for prosecution in the

event that no generic claims were allowed. Claims 8-9, 15-16 and 22 are rejected under 35 U.S.C. 102 (b) as being anticipated by the reference to Gordon et al., U.S. Patent No. 5,405,088.

IV. STATUS OF AMENDMENTS

Subsequent to the final rejection of January 24, 2002, a response was filed on April 24, 2002 which did not contain any claim changes. The arguments were considered, as indicated by the Advisory Action of May 14, 2002.

V. SUMMARY OF INVENTION

The present invention is concerned with an improved electrically activated valve used in fuel injection systems for internal combustion engines. In such systems, a fuel pump provides low pressure fuel to the inlet side of a high pressure pump which, in turn, injects the fuel at high pressure into the engine. The amount of fuel injected for each operating cycle is limited by an electrically activated valve. Prior art valves were either affected by wear based on solid particles in the fuel or cavitation which would disrupt the operation of the valve and, accordingly, the precise discharge of fuel. Prior art devices which restricted the wear by providing, for example, a slight overlap between the valve member and the valve seat, ultimately resulted in disrupting the flow conditions. Thus, prior art devices either increase the cavitation or cause the response of the valve to be impaired.

The present invention improves flow condition in the region of the valve seat without sacrificing prior art advantages. According to the present invention, the contact area between the valve member 10 and the valve seat 13 is bordered on the

outside by step 15 shown in Figs. 2-7. This step is adjoined by guide surface 16. The purpose of this step is to limit the effective hydraulic diameter of the valve member so that it remains constant over its entire life and at the same time to improve the flow. The guide surface 16, which adjoins the step 15, is configured in such a way that the fluid is diverted to a return passage in an optimum manner to thereby avoid cavitation and the noise associated with it.

VI. ISSUES

The issue presented for review is whether Claims 8-9, 15-16 and 22 are properly rejected under 35 U.S.C. 102 (b) as anticipated by the reference to Gordon et al., U.S. Patent No. 5,405,088.

VII. GROUPING OF THE CLAIMS

Claims 8-9, 15-16 and 22 do not stand or fall together as each has separate patentability.

VIII. ARGUMENTS

Appellants submit that independent Claims 8, 15 and 22 as well as dependent claims 9 and 16 each provide features which are not shown or disclosed by the reference to Gordon et al. '088.

The reference to Gordon et al., '088 is a fuel injection nozzle for an internal combustion engine having a body and a valve seat disposed on the side of the combustion chamber. An outwardly opening needle valve includes a closing head that has a closing cone which cooperates with the valve seat. An injection hole is disposed in the closing head which is supplied with fuel through a supply conduit

from the pressure chamber. The needle valve 15, in operation, is pulled against the valve seat 18 on the nozzle body 10 by closing spring 40 in the nozzle holder 12. The closing spring 40 keeps the needle valve 15 and the valve cone 14 against the valve seat 18 on the body 10. When fuel is conveyed under pressure through the supply conduit 27, pressure builds up on the piston valve 20 and the needle valve is displaced in the direction of flow so that the valve cone 17 lifts from the seat 18.

Independent claims 8 and 15 recite an annular space between the valve guide 9 and the valve member 10 which is not clear from the reference to Gordon. Furthermore, each of independent claims 8 and 15 recite that the contact area between the valve member 10 and the seat 13 has a step 15 adjoined by guide surface 16 with the guide surface being spaced radially further from the valve stem 8 then from the step 15 which is submitted as not being shown by Gordon.

According to the statement of the final rejection, the ring 19 of Gordon is fixed to the head 16 and together they form the valve member. In support of this position, a marked-up copy of Figure 2 of Gordon was attached to the final Office Action of January 24, 2002 with the supposed guide surface being shown in blue and the supposed step being highlighted in orange. The conclusion was then made that the structure of Gordon is the same as that recited in the claims. The disclosure of Gordon indicates that the piston valve is 20 and the valve seat is numbered 18. Therefore, there is no correspondence in Gordon with the valve stem which holds the valve member interacting with the valve seat on the housing. Furthermore, there is no showing of a valve guide for guiding the stem and the

valve housing based on Gordon's disclosure as to what element is labeled as a piston valve 20 and a valve seat 18. Still further, there is no annular space formed between the valve guide and the valve member which provides a contact area between the valve member and the valve seat as is specifically claimed. The space between 17 and 18 of Fig. 2 of Gordon is the only disclosed annular space. However, this "annular space" separates a nozzle body 10 from the ring 19. According to the interpretation of the final rejection, the space between 17 and 18 regulates the space between the nozzle body 10 and the "valve member consisting of the ring 19 and the head 16." Even if this interpretation, given in the final rejection, is accepted, this annular space is not the space of the claimed invention because the annular space 11 is formed between the valve guide 9 and the valve member 10. The valve guide is specifically claimed as having a purpose of guiding the valve stem 8 in the valve housing 2.

The only annular space in Gordon is bounded by the ring 19 and the nozzle body 10. The nozzle body 10 of Gordon cannot be interpreted to be a "valve guide for guiding said stem and valve housing." Therefore, regardless of how the contact area between 17 and 18 is interpreted in Gordon and also regardless of how the sloping surface adjoining the outer edge of 17 is interpreted, the remaining structure of Appellants' claimed invention is not part of the disclosure of Gordon.

It must be further emphasized that, aside from the structural features which distinguish the present invention from Gordon and aside from their interconnection,

Gordon '088 has completely different objects than the above discussed present invention.

Gordon has no suggestion concerning an electrically controllable valve but instead uses a pressure control fuel injection valve in order to charge the fuel according to the defined parameter in a finely distributed manner into the combustion space of an internal combustion engine. Subsequently, that fuel is mixed with air. To accomplish this mixture, the feed lines 27 and the injection bores 25 are placed in the valve body 20. The fuel is injected into the combustion space at high pressure and the uniform distribution of the fuel results from a plurality of these injection bores 25 being distributed around the circumference. The valve seat 17 is positioned in the flow direction behind the injection bores 25 to seal off the valve in the closed condition in order to avoid after-injection. In contrast, during the open condition of the valve, the fuel is injected through the bores 25 and the open gap between the surfaces 17 and 18 directly into the air filled combustion space in order to be divided into droplets mixed with air.

The process by which fuel jet impacts combustion air is one in which cavitation is not a factor. Furthermore, it is not desirable for liquid fuel in the flow direction behind the injection bore to wet the walls of the injection nozzle because the liquid fuel deposited on the wall is difficult to burn and leads to after-dripping of the nozzle which would lead to poor performance and high pollution.

Independent claim 22 defines that the valve member has a portion with a radius which exceeds the radius of the opening in the valve housing and is adjoined

by a guide surface positioned at a radius which exceeds the radius of the step. The reference to Gordon has no such structure. If the closing head 16 of Gordon is interpreted as that portion which exceeds the radius of the pressure chamber 21, then it cannot be associated with either a step or a guiding surface. Conversely, the valve cone 17 is part of the ring 19 which is placed on the end of the closing head 16. There is additionally no showing of the required radially spacing distances between any kind of a surface of Gordon that can be interpreted as a guide surface and a "step."

Independent claim 15 is separately patentable from independent claims 8 and 22 with respect to the recitation of the valve spring and the defining of the contact area formed between the valve member and the valve seat without reciting the annular space between the valve guide and the valve member. As such, each of independent Claims 8, 15 and 22 is separately patentable.

Claim 8 defines the aforementioned annular space which provides the contact area between the valve member and seat. Thus, claim 8 has separate patentability from Claims 15 and 22.

Dependent claim 9 limits the step 15 and the guide surface 16 to being arranged either on the valve housing 2 as shown in Figures 2-5, 7 or on the valve member 10 as shown in Fig. 6 which is a separately patentable feature. Likewise, claim 16 similarly limits claim 15 by reciting that the step and the guide surface are arranged either on the housing 2 or on the valve member 10. Therefore, claims 8-9,

15-16 and 22 do not stand or fall together, as each has separate patentability as discussed above.

IX. CONCLUSION

For these reasons, Appellants respectfully submit that the claimed invention, defined by independent Claims 8, 15 and 22 and dependent Claims 9 and 16, provides structure not shown or disclosed by the reference to Gordon '088. Therefore, it is respectfully requested that the decision of the Examiner be **REVERSED**. An appendix containing the claims under appeal is attached hereto.

This Appeal Brief is accompanied by a check in the amount of $320.00 in payment of the required appeal fee. This amount is believed to be correct, however, the Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. 05-1323 (Docket #225/48700). A triplicate copy of this Appeal Brief is attached.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #225/48700).

Respectfully submitted,

Date: **August 26, 2002**

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X. APPENDIX

8. An electrically activated valve comprising:

a valve stem holding a valve member interacting with a valve seat on a valve housing;

a valve spring providing a force in a first direction on said valve;

a value guide for guiding said valve stem in said valve housing:

an activating device which, when activated, provides a force in a direction opposite said first direction to axially move said valve stem and said valve member in said valve housing and said valve member interacting with said valve seat on said valve housing to thereby determine flow through said valve;

an annular space formed between said valve guide and said valve member, said annular space providing a contact area between the valve member and the valve seat which is bounded on one side by a step adjoined by a guide surface wherein a distance between said valve stem and said guide surface in greater than a distance from said valve stem and said step.

9. The valve according to Claim 8, wherein the step and the guide surface are arranged on at least one of the valve member and the valve housing.

15. A valve system, comprising:

a valve member having a valve stem;

a valve housing containing said valve stem and a valve seat;

a valve spring providing a biasing force in a first direction against said valve stem;

an activation device which, when activated, provides a force in a second direction opposite to said first direction to axially move said valve stem;

a valve guide for guiding said valve stem in said valve housing;

a contact area formed between the valve member and the valve seat, said contact area being bounded on one side by a step which is adjoined by a guide surface, said guide surface being located radially further from said valve stem than said step.

16. The arrangement according to claim 15, wherein the step and the guide surface are arranged on at least one of the valve member and the valve housing.

22. An electrically actuated valve comprising:

a valve stem holding a valve member interacting with a valve seat on a valve housing;

a valve spring providing a force in a first direction on said valve stem and said valve member;

a valve guide for guiding said valve stem in an inner circumferential opening of said valve housing;

an activating device which, when actuated provides a force in a direction opposite said first direction to axially move said valve stem and said valve member in said circumferential opening of said valve housing wherein said valve member interacts with said valve seat on said valve housing to thereby determine flow through said valve and;

wherein said valve member has a step portion formed at a portion of said valve member having a radius which exceeds a radius of said inner circumferential opening of said valve housing and wherein said step portion is adjoined by a guide surface positioned at a radius greater than said radius of said step and wherein said step and said adjoining guide surface defines one side of a contact area between the valve member and the valve seat.